COVINGTON

BEIJING BRUSSELS LONDON LOS ANGELES
NEW YORK SAN FRANCISCO SEOUL
SHANGHAI SILICON VALLEY WASHINGTON

Gerard J. Waldron

Covington & Burling LLP
One CityCenter
850 Tenth Street, NW
Washington, DC 20001-4956
T +1 202 662 5360
gwaldron@cov.com

April 12, 2018

Ms. Marlene H. Dortch
Secretary
Federal Communications Commission
445 12th Street, S.W.
Washington, D.C. 20554

Re: *Ex parte* presentation in IB Docket No. 11-109, IBFS File Nos. SES-MOD-20151231-00981, SAT-MOD-20151231-00090 and SAT-MOD-20151231-00091

Dear Ms. Dortch:

Attached please find a letter from Ligado Networks LLC (Ligado) to the National Executive Committee for Space-Based Positioning, Navigation and Timing (PNT EXCOM). The letter responds to the March 2018 Gap Analysis Final Report from the National Space-Based Positioning, Navigation, and Timing Systems Engineering Forum (NPEF) assessing several tests of the possible impact of adjacent band operations on Global Positioning System (GPS) receivers.[1] As Ligado's letter explains, the NPEF Report ignores our agreements with the major GPS manufacturers and improperly rejects state-of-the-art testing by the government's scientists and others in favor of outdated tests with erroneous criteria and other problems. We encourage the Commission, as the expert spectrum agency in consultation with NTIA, to consider the full record before it, which shows that Ligado can both protect GPS devices and enable the use of prime mid-band spectrum to enhance American competitiveness and security, invest in American infrastructure, and create thousands of new jobs.

A fundamental problem with the NPEF report is that it is at odds with the position of major GPS manufacturers. These manufacturers, including Deere, Garmin, Trimble, TopCon, and NovAtel, have taken a markedly different approach than the one reflected in the NPEF report: rather than insisting on an inapplicable and unworkable criterion as the NPEF Report does, the GPS companies worked with Ligado to reach agreement on technical parameters for co-existence. The agreements include substantially restricted operating parameters for Ligado, including dramatically lower power and emissions levels, as well as a 23 MHz "guard band" to

[1] *See* James R. Horejsi and Kenneth K. Alexander, Memorandum for the National Coordination Office Space-Based PNT Executive Committee (Mar. 5, 2018), available at https://www.gps.gov/spectrum/ABC/2018-03-NPEF-gap-analysis.pdf, attaching National Space-Based PNT Systems Engineering Forum, Final Report: Assessment to Identify Gaps in Testing of Adjacent Band Interference to the Global Positioning System (GPS) L1 Frequency Band (Mar. 1, 2018).

protect GPS. As a result of these concessions, the GPS companies have indicated that they do not object to Ligado's proposed terrestrial operations.

By contrast, the NPEF Report endorses testing that is based on the assertion that the proper metric for assessing interference is an interference protection criteria of a change of 1 dB in the noise floor rather than the long-established standard of harmful interference. This is a central and fatal flaw for multiple reasons. First, the 1 dB metric has only been applied to emissions in the *same band* and thus does not apply here, where regulators are considering the impact of Ligado's emissions within a spectrum band that is *adjacent* to GPS. Second, the 1 dB metric is neither accurate nor reliable. Testing by NASCTN and other experts has clearly established that a 1 dB change in the noise floor does not correlate to whether a GPS device actually experiences degraded performance, *i.e.*, harmful interference. Those data clearly show that there is no consistent method for accurately measuring and reporting changes in the noise floor.

By using an inapplicable and unreliable metric to assess Ligado's proposed operations in a band outside the GNSS band, the NPEF and other parties reveal their basic misunderstanding of spectrum policy and well-established law. This misunderstanding is illustrated by the NPEF Report's statement that "operational systems" already inhabit not only the GNSS L1 frequency band but "adjacent bands" as well. It is a basic tenet of spectrum policy that services must take steps to ensure that energy outside their channels does not become harmful interference to them.[2] The NPEF Report, however, ignores that fundamental principle in favor of a policy that overturns the Table of Allocations and effectively grants a form of "adverse possession" to all GPS devices—no matter how old or poorly made—over nearby bands.

NPEF's misguided approach is perhaps not surprising given that NPEF has ventured far outside its area of expertise and authority. To be clear, the NPEF has no spectrum management expertise or authority. Rather, according to its charter, the NPEF is a "permanent working group" that provides "a forum for analysis and discussion of systems engineering issues and technology development opportunities relative to" GPS and GPS augmentation systems.[3] Notwithstanding this lack of jurisdiction over spectrum, in assessing the testing performed to date, the NPEF has applied criteria developed by the National Space-Based PNT Advisory Board (PNTAB), another entity with no spectrum authority or expertise.

This lack of expertise is borne out in the NPEF Report itself. The NPEF uses the PNTAB's criteria to dismiss nearly 1,500 hours of testing performed Boulder labs of the National Advanced Spectrum and Communications Test Network (NASCTN), a joint initiative of the Departments of Defense and Commerce. That testing confirms that Ligado's proposed

[2] *See* Spectrum and Receiver Performance Working Group - FCC Technological Advisory Council, Basic Principles for Assessing Compatibility of New Spectrum Allocations: A White Paper, Release 1.1 (Dec. 11, 2015), at 13-14.
[3] *See* National Space-Based Positioning, Navigation and Timing Systems Engineering Forum Charter, (Oct. 29, 2013), *available at* https://www.gps.gov/governance/excom/groups/npef/. By contrast, the basic functions of the Interdepartment Radio Advisory Committee (IRAC), which includes the same member agencies as the PNT EXCOM, are "to assist [NTIA] in assigning frequencies to U.S. Government radio stations and in developing and executing policies, programs, procedures, and technical criteria pertaining to the allocation, management and use of the electromagnetic spectrum." *See* Interdepartment Radio Advisory Committee (IRAC), *available at* https://www.ntia.doc.gov/page/interdepartment-radio-advisory-committee-irac (last visited Apr. 10, 20128).

operations can coexist with GPS. While rejecting that testing, the NPEF Report identifies other tests that it assesses "sufficient and appropriate to inform spectrum policy makers on the major impacts of the proposed LTE network on GPS receivers." As Ligado's letter to the EXCOM explains, however, the NPEF Report's assessment improperly applies only the PNTAB's criteria even though a foundational part of those criteria do not apply in the context of Ligao's pending application.

Both the industry agreements and the thousands of hours performed by NASCTN demonstrate that Ligado's proposed operations will protect GPS and enable the use of prime mid-band spectrum to generate enormous public benefits. Ligado encourages the Commission to move forward with the company's applications so it can develop a next-generation network that will provide billions of dollars in consumer benefits, generate thousands of American jobs and advance leadership in spectrum technology.

Sincerely,

/s/ Gerard J. Waldron
Gerard J. Waldron
Counsel to Ligado Networks LLC

Attachment

cc: Ron Repasi
Charles Mathias
Bob Nelson
Paul Murray
Paul Powell

ligado NETWORKS | Making Stronger Connections

April 9, 2018

Honorable Patrick M. Shanahan
Deputy Secretary of Defense

Honorable Jeffrey A. Rosen
Deputy Secretary of Transportation

National Executive Committee for Space-Based Positioning, Navigation and Timing
Herbert C. Hoover Building, Room 2518
1401 Constitution Ave., NW
Washington, D.C. 20230

Re: Response to March 5, 2018 Memorandum to the National Coordination Office of the Space-Based PNT Executive Committee Regarding Gap Analysis Final Report

Dear EXCOM Co-Chairs:

I am writing to respond to a March 5, 2018 memorandum to you attaching the National Space-Based PNT Systems Engineering Forum (NPEF) Gap Analysis Final Report ("Gap Analysis"),[1] which provides its assessment of several tests related to the possible impact on Global Positioning System (GPS) receivers of operations in adjacent, and some not-so-adjacent, bands. I submit this letter to highlight fundamental flaws in the Gap Analysis and also to draw to your attention other considerations essential to rendering an informed decision on Ligado Networks' proposed terrestrial operations as they relate to GPS.

First, you should be aware of a fact that is not mentioned anywhere in the Gap Analysis: all of the major GPS companies—*i.e.*, those in the private sector that actually design and manufacture GPS devices for their hundreds of millions of customers, including the federal government—have stated explicitly that they do not oppose Ligado's proposed spectrum operations. These companies, including industry leaders Deere, Garmin, Trimble, NovAtel, and Topcon worked with Ligado to reach agreements on Ligado's new, reduced operational levels that would meet the needs of these GPS companies. The agreements were designed to address concerns GPS manufacturers had with prior proposals to use spectrum bands near GPS.

[1] *See* James R. Horejsi and Kenneth K. Alexander, *Memorandum for the National Coordination Office Space-Based PNT Executive Committee* (Mar. 5, 2018), *available at* https://www.gps.gov/spectrum/ABC/2018-03-NPEF-gap-analysis.pdf, *attaching* National Space-Based PNT Systems Engineering Forum, *Final Report: Assessment to Identify Gaps in Testing of Adjacent Band Interference to the Global Positioning System* (GPS) L1 Frequency Band (Mar. 1, 2018).

These new operational parameters, which are now pending before the Federal Communications Commission (FCC) for approval, imposed on Ligado significant restrictions, including relinquishing certain rights to spectrum to create a 23 megahertz "guard band" to protect GPS and drastically reduced power and transmission levels, as well as an agreement to coordinate going forward. These GPS companies have told the FCC they have no objection to the Commission approving Ligado's spectrum plans.

Second, the Gap Analysis is flawed because it is based on criteria that simply have no basis in spectrum regulation. Ligado and many others have brought these exact concerns to the attention of the PNT Advisory Board on more than one occasion and have been ignored. I will not repeat all of our concerns here but will focus on the most critical error: the Gap Analysis concludes that the only testing that matters is the testing for a change of 1 dB in the noise floor caused by operations in adjacent bands, and it gives no value to the almost 1,500 hours of testing done by the joint Defense and Commerce-run National Advanced Spectrum and Communications Test Network (NASCTN), which examined *both* changes in 1 dB and also whether the GPS devices are functioning as they should be. Contrary to the suggestion in the Gap Analysis and repeated statements from the PNT Advisory Board, no spectrum regulator or standards body in the United States or at the International Telecommunications Union has ever used a 1 dB change in the noise floor as a basis to regulate a user of spectrum in an *adjacent* band. What spectrum managers actually regulate is harmful interference and that is exactly what was measured at NASCTN's lab.[2]

The metric of a 1 dB change in the noise floor is appropriately used by regulators to govern users who *share* a band, sometimes referred to as a "co-channel interference." While Ligado's operations and GPS are near each other (but not exactly "adjacent" given the 23-megahertz guard band), the truth is that under all spectrum regulations *GPS and Ligado do not share a band*. That is a fact some GPS advocates seem unwilling to accept. Indeed, the Gap Analysis itself does not recognize this fact, stating "the GNSS L1 frequency band *(and its adjacent bands) are already inhabited by operational systems*."[3] GPS devices may in fact "already inhabit[]" "adjacent bands" [read: Ligado's spectrum], but it is akin to a takings by adverse possession to suggest that GPS devices, having occupied Ligado's spectrum (where they are not supposed to be), are now entitled to protection as if they belonged there. That is not how spectrum regulation works; that is also not how a fair government process should work.

Third, as mentioned above, the Gap Analysis fails to mention that the major GPS companies do not oppose Ligado's spectrum proposal, and compounds that sin of omission by giving no credence to the testing done by NASCTN. But the NASCTN testing is highly relevant since the NASCTN data enable one to conclude that, not surprisingly, the GPS companies know what they are talking about. Specifically, review of those results validates the conclusion of the GPS companies that devices in every category of the GPS ecosystem can co-exist today or can readily be made to co-exist with Ligado's new operational parameters.

---

[2] The FCC's rules define "harmful interference" as interference that "endangers the functioning of a radionavigation service or of other safety services or seriously degrades, obstructs, or repeatedly interrupts a radiocommunication service operating in accordance with [the ITU] Radio Regulations." 47 C.F.R. § 2.1(c) (brackets in original).

[3] *Gap Analysis* at 14 (emphasis added).

* * *

We urge the EXCOM to assess the Gap Analysis in the context of broader efforts underway to protect GPS devices. Industry consensus and data from the NASCTN tests have validated the idea that Ligado's proposed operations can both protect GPS devices and enable the use of prime spectrum to generate enormous public benefits. The NPEF's fundamentally flawed Gap Analysis should not prevent the Government from moving forward on a decision to make use of the spectrum in a prudent and responsible manner that will be used to develop a next generation 5G and Internet of Things network and advance U.S. technological leadership.

Sincerely,

Doug Smith
President & CEO

cc: Secretary Wilbur Ross, U.S. Department of Commerce
David Redl, Assistant Secretary for Communications and Information and Administrator, National Telecommunications and Information Administration, U.S. Department of Commerce
John Stenbit, Chair, PNT Advisory Board
Kenneth K. Alexander, DOT NPEF Co-Chair
James R. Horejsi, DOD NPEF Co-Chair
Marlene Dortch, Secretary, Federal Communications Commission